CLAIMS:

1. An electrophoretic display (1) with a pixel (10) comprising:

a reservoir volume (RV) and an image volume (PV),

different types of particles (Pa, Pb, Pc) having different colors and different electrophoretic mobilities, wherein the particles (Pa, Pb, Pc) determine a visible color of the pixel (10) when present in the image volume (IV), and wherein the particles (Pa, Pb, Pc) do not contribute to the visible color of the pixel (10) when present in the reservoir volume (RV),

select electrodes (SE1, SE2) for generating in the reservoir volume (RV) a select electric field (SF) for separating the different types of particles (Pa, Pb, Pc) in different sub-volumes (SVa, SVb, SVc) in the reservoir volume (RV), and

at least one fill electrode (FE1, FE2) for generating a fill electric field (FF) to move the different types of particles (Pa, Pb, Pc) from the sub-volumes (SVa, SVb, SVc) into the image volume (IV).

2. An electrophoretic display (1) as claimed in claim 1, wherein the at least one fill electrode (FE1, FE2) is positioned to obtain the fill electric field (FF) directed for simultaneously moving the different types of particles (Pa, Pb, Pc) from the sub-volumes (SVa, SVb, SVc) into the image volume (IV).

3. An electrophoretic display (1) as claimed in claim 1, wherein the fill electrodes (FE2) comprise sub fill electrodes (FE2a, FE2b, FE2c) associated with the different sub-volumes (SVa, SVb, SVc) for generating the fill electric field (FF) to comprise sub fill electric fields (FFa, FFb, FFc) in the different sub-volumes (SVa, SVb, SVc).

4. An electrophoretic display (1) as claimed in claim 3, wherein the select electric field (SF) extends in a first direction (y) and the sub fill electric fields (FFa, FFb, FFc) in a second direction (x) different from the first direction

5. An electrophoretic display (1) as claimed in claim 4, wherein the reservoir volume comprises shielding electrodes (FE1a, FE1b) for substantially shielding in the first direction (y) the sub fill electric fields (FFa, FFb, FFc) of the different sub-volumes (SV1, SV2, SV3) from each other.

6. An electrophoretic display (1) as claimed in claim 4, wherein the pixel (10) comprises a further fill electrode (CF) arranged in the image volume (IV) in the second direction further away from the reservoir volume (RV) than the sub fill electrodes (FE2a, FE2b, FE2c) for attracting the particles (Pa, Pb, Pc) leaving the sub-volumes (SVa, SVb, SVc) further into the image volume (IV).

7. An electrophoretic display (1) as claimed in claim 6, wherein the further fill electrode (CF) is positioned in the second direction (x) at a border of the image volume (IV) at a maximal distance from the reservoir volume (RV).

8. An electrophoretic display (1) as claimed in claim 6, wherein the further fill electrode (CF) is positioned in the second direction (x) within the image volume (IV) but at less than the maximal distance from the reservoir volume (RV).

9. An electrophoretic display (1) as claimed in claim 6, wherein the further fill electrode (CF) is positioned with respect to the sub-volumes (SVa, SVb, SVc) to obtain a fill electric field which is higher for the particles (Pa) having a slower electrophoretic mobility than for the particles having a higher electrophoretic mobility.

10. An electrophoretic display (1) as claimed in claim 1, further comprising:

a further reservoir volume (FRV),

further select electrodes (SEV1, SEV2) for generating in the further reservoir volume (FRV) a further select electric field (SFV) for separating the different types of particles (Pa, Pb, Pc) in further different sub-volumes (FSVa, FSVb, FSVc) in the further reservoir volume (FRV), and

further fill electrodes (FFE2a, FFE2b, FFE2c) for generating a further fill electric field (FFFa, FFFb, FFFc) to simultaneously or time sequentially move the different types of particles (Pa, Pb, Pc) from the further sub-volumes (FSVa, FSVb, FSVc) into the image volume (IV).

11. An electrophoretic display as claimed in claim 10, wherein the electrophoretic display (1) comprises a controller for controlling the first mentioned select electrodes (SE1, SE2), the at least one first mentioned fill electrode (FE1, FE2), the further select electrodes (SEV1, SEV2), and the further fill electrodes (FFE2a, FFE2b, FFE2c) to obtain a separation of the different types of particles (Pa, Pb, Pc) in the first mentioned reservoir volume (RV) simultaneously to filling or resetting particles (Pa, Pb, Pc) to or from the further reservoir volume (FRV), or the other way around.

12. An electrophoretic display as claimed in claim 1, wherein the image volume (IV) is box shaped, the select electrodes (SE1, SE2) being arranged for generating the select electric field (SF) in a first direction (y) substantially parallel with a border plane of the image volume (IV), and the fill electrodes (FE1, FE2) being arranged for generating the fill electric field (FF) in a second direction (x) substantially perpendicular to the first direction (y).

13. An electrophoretic display as claimed in claim 1, further comprising reset means (SE1) for removing the particles (Pa, Pb, Pc) from the image volume (IV) to store the particles (Pa, Pb, Pc) in a store volume (SV) in the reservoir volume (RV).

14. An electrophoretic display as claimed in claim 13, wherein the reset means (SE1) comprise one of the select electrodes (SE1) for attracting the particles (Pa, Pb, Pc) in the image volume (IV) towards the store volume (RV) adjacent to the one of the select electrodes (SE1).

15. An electrophoretic display as claimed in claim 1, wherein the mobility of the different types of particles (Pa, Pb, Pc) has a predetermined ratio, and wherein a movement path of the particles (Pa, Pb, Pc) in the reservoir volume has a length to enable the particles (Pa, Pb, Pc) to be separated in the sub-volumes (SVa, SVb, SVc) which are substantially non-overlapping.

16. An electrophoretic display as claimed in claim 15, wherein the different types of particles (Pa, Pb, Pc) comprise a first, second and third type of particles all being charged in the same polarity, and having different mobilities.

17. An electrophoretic display as claimed in claim 15, wherein the different types of particles (Pa, Pb, Pc) comprise a first and a second type of particles both being charged in the same polarity and having different mobilities and a third type of particles being charged oppositely.

18. An electrophoretic display as claimed in claim 1, wherein the pixel comprises a reset electrode (RE) to attract the particles (Pa, Pb, Pc) during a reset phase wherein the particles (Pa, Pb, Pc) have to be moved into a store volume (SV) in the reservoir volume (RV).

19. An electrophoretic display as claimed in claim 18, wherein the reset electrode (RE) is associated with the center of the image volume (IV), and wherein the electrophoretic display further comprises a processor (3) for successively supplying a voltage to the reset electrode to attract the particles (Pa, Pb, Pc) towards the center of the image volume (IV) and a voltage to one of the select electrodes (SE1) being associated with the store volume (SV) to attract the particles (Pa, Pb, Pc) to move into the store volume (SV).

20. A method of driving an electrophoretic display (1) with a pixel (10), the electrophoretic display comprising:

a reservoir volume (RV) and a image volume (IV),

different types of particles (Pa, Pb, Pc) having different colors and different electrophoretic mobility's, wherein the particles (Pa, Pb, Pc) determine a visible color of the pixel (10) when present in the image volume (IV), and wherein the particles (Pa, Pb, Pc) do not contribute to the visible color of the pixel (10) when present in the reservoir volume (RV), the method comprising:

generating (SE1, SE2) in the reservoir volume (RV) a select electric field (SF) for separating the different types of particles (Pa, Pb, Pc) in different sub-volumes (SVa, SVb, SVc) in the reservoir volume (RV), and

generating (FE1, FE2) a fill electric field (FF) to move the different types of particles (Pa, Pb, Pc) from the sub-volumes (SVa, SVb, SVc) into the image volume (IV).

21. A display apparatus comprising an electrophoretic display as claimed in claim 1.